SEA-9203

Multi-Definition SDI Equalizing Amplifier

User Manual

Video Production Technology

SEA-9203 User Manual

- Ross Part Number: **9203DR-004-03**
- Release Date: November 7, 2012.

The information contained in this manual is subject to change without notice or obligation.

Copyright

© 2012 Ross Video Limited. All rights reserved.

This work is proprietary and confidential to Ross Video Limited, its subsidiaries and its other affiliated corporations and may not be copied, distributed, sold or otherwise used or relied upon without the express written permission of Ross Video Limited. Reproduction or reverse engineering of copyrighted software is prohibited.

Patents

This product is protected by the following US Patents: 4,205,346; 5,115,314; 5,280,346; 5,561,404; 7,034,886; 7,508,455; 7,602,446; 7,834,886; 7,914,332. This product is protected by the following Canadian Patents: 2039277; 1237518; 1127289. Other patents pending.

Notice

The material in this manual is furnished for informational use only. It is subject to change without notice and should not be construed as commitment by Ross Video Limited. Ross Video Limited assumes no responsibility or liability for errors or inaccuracies that may appear in this manual.

Trademarks

- ROSS is a registered trademark of Ross Video Limited.
- GearLite is a trademark of Ross Video Limited.
- Ross, ROSS, ROSS®, and MLE are registered trademarks of Ross Video Limited.
- VELCRO® is a registered trademark of Velcro Industries B.V.
- All other product names and any registered and unregistered trademarks mentioned in this manual are used for identification purposes only and remain the exclusive property of their respective owners.

Important Regulatory and Safety Notices to Service Personnel

Before using this product and any associated equipment, refer to the "**Important Safety Instructions**" listed below to avoid personnel injury and to prevent product damage.

Product may require specific equipment, and/or installation procedures to be carried out to satisfy certain regulatory compliance requirements. Notices have been included in this publication to call attention to these specific requirements.

Symbol Meanings

Protective Earth — *This symbol identifies a Protective Earth (PE) terminal, which is provided for connection of the supply system's protective earth (green or green/yellow) conductor.*

This symbol on the equipment refers you to important operating and maintenance (servicing) instructions within the Product Manual Documentation. Failure to heed this information may present a major risk of damage or injury to persons or equipment.

Warning — *The symbol with the word "**Warning**" within the equipment manual indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*

Caution — *The symbol with the word "**Caution**" within the equipment manual indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.*

Warning Hazardous Voltages — *This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product enclosure that may be of sufficient magnitude to constitute a risk of shock to persons.*

ESD Susceptibility — *This symbol is used to alert the user that an electrical or electronic device or assembly is susceptible to damage from an ESD event.*

Important Safety Instructions

1. **Warning** – Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. The safe operation of this product requires that a protective earth connection be provided. A grounding conductor in the equipment's supply cord provides this protective earth. To reduce the risk of electrical shock to the operator and service personnel, this ground conductor must be connected to an earthed ground.
6. Do not defeat the safety purpose of the grounding-type plug. A grounding type plug has two blades and a third grounding prong. The third prong is provided for your safety. If the provided plug does not fit in to your outlet, consult an electrician for replacement of the obsolete outlet. Protect the power cord from being walked on or pinching particularly at plugs, convenience receptacles, and point where they exit from the apparatus.

7. **Warning – Indoor Use: WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
8. Do not block ventilation openings. Install in accordance with manufacturer's instructions.
9. Do not install near heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
10. Do not use this apparatus near water.
11. Only use attachments/accessories specified by the manufacturer.
12. Unplug this apparatus during lightning storms or when unused for long periods of time.
13. Clean only with a dry cloth.
14. To avoid electrical shock, disconnect the A/C power cord before any servicing.
15. Refer all servicing to qualified personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug damage, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

EMC Notices

United States of America
FCC Part 15

This equipment has been tested and found to comply with the limits for a class A Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Notice — *Changes or modifications to this equipment not expressly approved by Ross Video Limited could void the user's authority to operate this equipment.*

CANADA

This Class "A" digital apparatus complies with Canadian ICES-003.

Cet appariel numerique de la classe "A" est conforme a la norme NMB-003 du Canada.

EUROPE

This equipment is in compliance with the essential requirements and other relevant provisions of **CE Directive 93/68/EEC**.

INTERNATIONAL

This equipment has been tested to **CISPR 22:1997** along with amendments **A1:2000** and **A2:2002**, and found to comply with the limits for a Class A Digital device.

Notice — *This is a Class A product. In domestic environments, this product may cause radio interference, in which case the user may have to take adequate measures.*

Maintenance/User Serviceable Parts

Routine maintenance to this GearLite product is not required. This product contains no user serviceable parts. If the module does not appear to be working properly, please contact Technical Support using the numbers listed under the

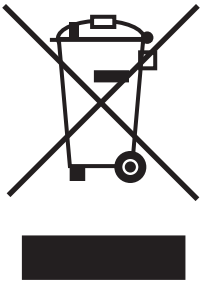
"Contact Us" section on the last page of this manual. All GearLite products are covered by a generous 3-year warranty and will be repaired without charge for materials or labor within this period. See the "Warranty and Repair Policy" section in this manual for details.

Environmental Information

The equipment that you purchased required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

To avoid the potential release of those substances into the environment and to diminish the need for the extraction of natural resources, Ross Video encourages you to use the appropriate take-back systems. These systems will reuse or recycle most of the materials from your end-of-life equipment in an environmentally friendly and health conscious manner.

The crossed-out wheeled bin symbol invites you to use these systems.



If you need more information on the collection, reuse, and recycling systems, please contact your local or regional waste administration.

You can also contact Ross Video for more information on the environmental performances of our products.

Introduction

Overview

The SEA-9203 Multi-Definition SDI Equalizing Amplifier is part of the GearLite 9000 series of self-contained, small brick-format modules. The SEA-9203 is designed for use in both SD and HD systems where signals of more than one digital standard are distributed. The amplifier automatically equalizes up to 305m (1000ft) of Belden 8281 input cable at 270Mbps or up to 100m (325ft) of Belden 1694A input cable at 1485Mbps. The SEA-9203 operates on all serial digital standards, from 143Mbps up to and including 1485Mbps. Special measures have been taken to ensure excellent return loss at both input and output. This ensures error-free performance with short cables.

The front panel of the SEA-9203 chassis provides visual performance indicators and a user accessible DIP switch to select either SD or HD signals.

The SEA-9203 is delivered with a universal power adaptor and line cord suitable for the country of use. Various mounting options are included that allow a wide range of installation choices. The SEA-9203 provides a broadcast-quality SDI distribution solution in a small, stand-alone package.

Simplified Block Diagram

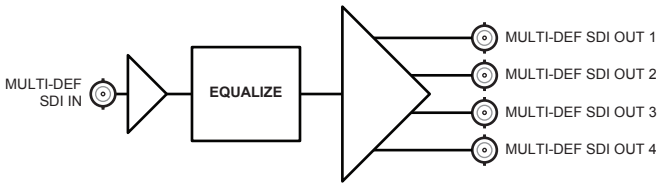


Figure 1 *Simplified Block Diagram of SEA-9203 Functions*

Features

The SEA-9203 includes the following features:

- Automatically supports common data rates (143Mbps to 1485Mbps)
- Automatic input cable equalization up to 305m (1000ft) of Belden 8281 cable @ 270Mbps or up to 100m (325ft) of Belden 1694A cable @ 1485Mbps
- Excellent I/O specifications
- Terminating input 75ohms
- Visual indicator LEDs for power, status, and signal setting
- Small brick form factor
- 5V universal adapter with locking DC connector
- 3-year warranty

Installation

Static Discharge

Whenever handling the SEA-9203 and other related equipment, please observe all static discharge precautions as described in the following note:

ESD Susceptibility — *Static discharge can cause serious damage to sensitive semiconductor devices. Avoid handling circuit boards in high static environments, such as carpeted areas, and when wearing synthetic fiber clothing. Always exercise proper grounding precautions when working on circuit boards and related equipment.*

Unpacking

Unpack each SEA-9203 you received from the shipping container and check the contents to ensure that all items are included. If any items are missing or damaged, contact your sales representative or Ross Video directly.

Mounting and Installation

The SEA-9203 can be mounted in any convenient location. However, to ensure long life for this product, observe the following precautions and operating requirements:

- Maintain an ambient temperature of 20°C to 40°C.
- Allow for air circulation around the chassis for convectional cooling.

Many different mounting positions are possible with the included mounting hardware. Some installation options are permanent and require careful consideration of the final positioning before installation. Please note that in some mounting locations, the power adaptor must be affixed in a similar manner as the chassis.

Other possible options include the use of adhesive magnetic sheets (not included) affixed to the chassis and the power adaptor, for removable mounting on metal cabinets etc.

Cable ties may be necessary in some applications to relieve strain on the mounting hardware and the connectors.

Surface Mount Strips

The included VELCRO® brand surface mount strips allow the GearLite module and power supply to be affixed to a permanent location during use and easily

removed for adjustments. Carefully consider the installation location before proceeding; the adhesive is very aggressive and is not easily removed. The adhesive will cure fully in 24 hours.

To install the Surface Mount Strips

1. Remove the **Protective Backing Film** from the adhesive on the bottom of the two VELCRO® brand **Surface Mount Strips**.
2. Adhere the **Surface Mount Strips** to the bottom side of the chassis. (**Figure 2**)

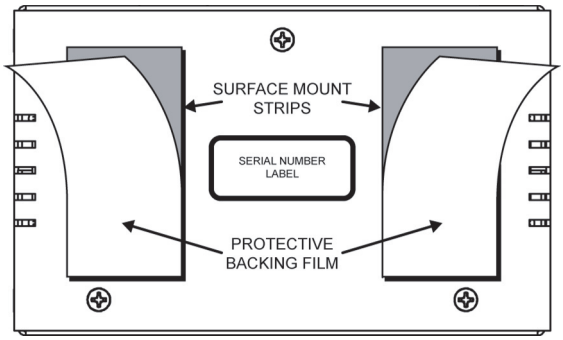


Figure 2 *Surface Mount Installation Option*

3. Remove the **Protective Backing Film** from the other side of the VELCRO® brand **Surface Mount Strips**.
4. Press the chassis into position on the surface you want to mount it to.

Operating Tip — *An additional VELCRO® brand **Surface Mount Strip** is available to mount the power adapter.*

Non-Slip Pads

Four non-slip adhesive pads have been supplied for desktop placements. Simply remove the protective backing film from the adhesive and affix one non-slip pad to each of the four corners on the bottom of the chassis.

Optional Mounting Accessories

Ross Video is committed to providing practical solutions for the needs of your high-quality broadcast facility.

Flat Metal Plate

Use the flat metal plate for permanent mounting to a rack, a desk, or any other location where bolts or screws can be applied. Be sure to position the module to allow for operator adjustments, if required.

To install the Flat Metal Plate

1. Remove the **2** screws from the bottom of the chassis.
2. Install the **Flat Metal Plate** onto the bottom of the chassis (**Figure 3**) using the screws provided in the Mounting Kit. Do not use the screws removed during **Step 1.**

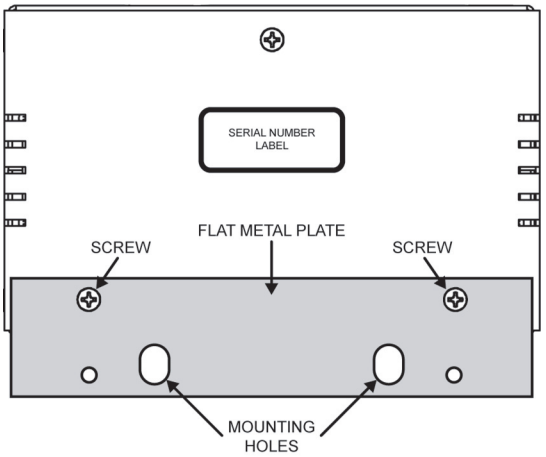


Figure 3 *Flat Metal Plate Installation Option*

3. Install the chassis in the desired location using the **Mounting Holes** on the **Flat Metal Plate**. Mounting screws are not provided by Ross Video.

Angle Mounting Bracket

The Angle Mounting Bracket (**Figure 4**) allows a single GearLite module to be installed in positions not possible with the flat metal plate. The bracket has a 90° angle. Mounting screws are not provided by Ross Video.

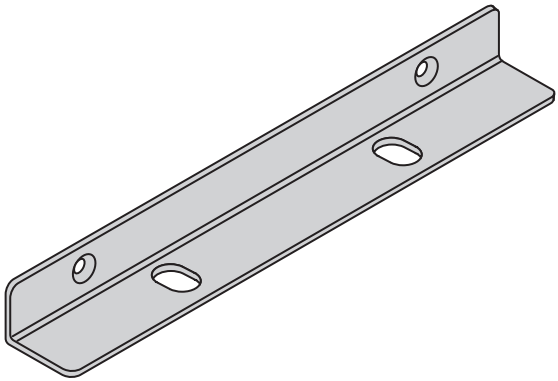


Figure 4 *Angle Mounting Bracket*

Setup

Note — *In this manual, the term SDI (Serial Digital Interface) is used throughout. SDI refers to both Standard Definition (up to 540Mbps) and High Definition (1485Mbps) signals.*

Power Adapter and Supply

Connect the PS-9000 power adaptor to the power supply connector. The PS-9000 provides up to 2A of regulated +5V DC (5%). The DC power cord has a locking connector that securely fastens into the power supply DC jack on the SEA-9203. The SEA-9203 has a standard miniature power jack (center pin positive).

If using an adaptor other than the PS-9000, ensure that:

- the polarity is correct
- the voltage is +5V DC regulated to 5%
- sufficient current for the SEA-9203 is supplied

Caution — *Use of improper adaptors may damage the SEA-9203 and will void the warranty.*

Installations outside of North America using line voltages of 200-240V require a plug, certified for the country of use, to be installed on the supplied line cord. Refer to the section "**Important Regulatory and Safety Notices to Service Personnel**" at the front of this manual for details.

Cable Connections Overview

Connect the cables to the SEA-9203 according to the designations indicated on the chassis label and **Figure 5**. The input is internally terminated at 75ohm. It is not necessary to terminate unused outputs.

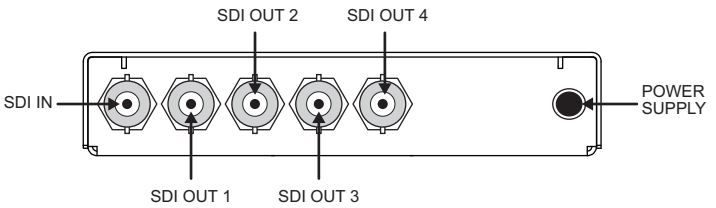


Figure 5 *SEA-9203 Connections*

Output Polarity

SDI OUT 1 and 3 are inverting.

SDI OUT 2 and 4 are non-inverting.

DIP Switches

The front edge of the SEA-9203 includes a DIP switch (**SW1**) which sets the SEA-9203 to pass a SMPTE-compliant HD or SD signal. Refer to **Figure 6** for the location of **SW1**.

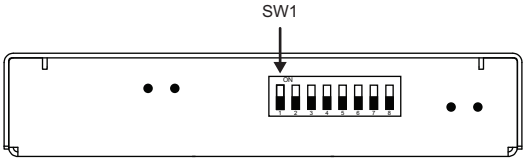


Figure 6 *SEA-9203 — DIP Switch Location*

Set **SW1** as follows:

- Set **SW1** in the **Up** position to pass an HD signal.
- Set **SW1** in the **Down** position to pass an SD signal.

Note —***SW2*** *to* ***SW8*** *are not implemented.*

Multi-Rate Operation

If the SEA-9203 is used in an environment where both SD and HD signals are in use, set the **SW1** to the **Up** position. The SD signals will be equalized and distributed cleanly, although all SMPTE specifications may not be met.

Status LEDs

The front panel of the module has four LEDs that display the status of the signals, the type of signal selected, and indicate whether the device is on or off. **Figure 7** indicates the location of the LEDs. **Table 1** describes the status LEDs available on the SEA-9203.

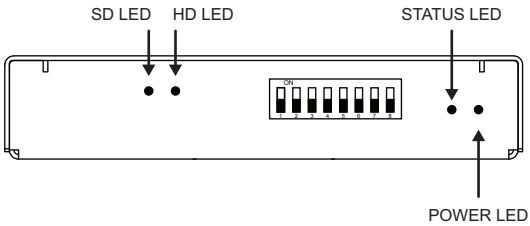


Figure 7 *SEA-9203 — LEDs*

Table 1 Status LED Descriptions

LED	Color	Function
HD	Yellow	When lit, this LED indicates that an HD signal is selected.
SD	Yellow	When lit, this LED indicates that an SD signal is selected.
STATUS	Green	When lit green, this LED indicates a valid input signal.
	Red	When lit red, this LED indicates that an input signal carrier could not be detected.
POWER	Green	When lit, this LED indicates the SEA-9203 is powered on.

Specifications

Specifications are subject to change without notification.

Table 2 SEA-9203 — Technical Specifications

Category	Parameter	Specification
Serial Digital Video Input	Number of Inputs	1
	Data Rates	SMPTE 259M: 143Mbps, 177Mbps, 270Mbps, 360Mbps
		SMPTE 344M: 540Mbps
		SMPTE 292M: 1483.5Mbps, 1485Mbps
	Impedance	75ohm terminating
	Return Loss	SD: >20dB to 360MHz HD: >15dB to 1485MHz
	Equalization (Belden 1694A cable)	SD: 305m (1000ft) HD: 100m (325ft)
Serial Digital Video Output	Number of Outputs	4
	Impedance	75ohm
	Return Loss	SD: >22dB to 360MHz HD: >16dB to 1485MHz (HD)
	Signal Level	800mV ±10%
	DC Offset	0V ± 50mV
	Rise and Fall Time	SD: 700ps typical HD: 120ps typical
	Overshoot	<8% typical
Power	Power Requirements	5V DC (5% regulation)
	Power Consumption	<1.0W @ 270Mbps (191mA)
Other	Operating Range	20°C to 40°C ambient
	Dimensions	13cm x 9.5cm x 2.5cm (5” x 4” x 1”)
	Weight	326g (11.5oz)

Service Information

Warranty and Repair Policy

The GearLite SEA-9203 is warranted to be free of any defect with respect to performance, quality, reliability, and workmanship for a period of THREE (3) years from the date of delivery to the customer. In the event that your GearLite SEA-9203 proves to be defective in any way during this warranty period, Ross Video Limited reserves the right to repair or replace this piece of equipment with a unit of equal or superior performance characteristics.

Should you find that this GearLite SEA-9203 has failed after your warranty period has expired, we will repair your defective product should suitable replacement components be available. You, the owner, will bear any labor and/or part costs incurred in the repair or refurbishment of said equipment beyond the THREE (3) year warranty period.

In no event shall Ross Video Limited be liable for direct, indirect, special, incidental, or consequential damages (including loss of profits) incurred by the use of this product. Implied warranties are expressly limited to the duration of this warranty.

This GearLite SEA-9203 User Manual provides all pertinent information for the safe installation and operation of your GearLite Product. Ross Video policy dictates that all repairs to the GearLite SEA-9203 are to be conducted only by an authorized Ross Video Limited factory representative. Therefore, any unauthorized attempt to repair this product, by anyone other than an authorized Ross Video Limited factory representative, will automatically void the warranty. Please contact Ross Video Technical Support for more information.

In Case of Problems

Should any problem arise with your GearLite SEA-9203, please contact the Ross Video Technical Support Department. (Contact information is supplied at the end of this publication.)

A Return Material Authorization number (RMA) will be issued to you, as well as specific shipping instructions, should you wish our factory to repair your GearLite SEA-9203. If required, a temporary replacement module will be made available at a nominal charge. Any shipping costs incurred will be the responsibility of you, the customer. All products shipped to you from Ross Video Limited will be shipped collect.

The Ross Video Technical Support Department will continue to provide advice on any product manufactured by Ross Video Limited, beyond the warranty period without charge, for the life of the equipment.

Notes:

Notes:

Notes:

Contact Us

Contact our friendly and professional support representatives for the following:

- Name and address of your local dealer
- Product information and pricing
- Technical support
- Upcoming trade show information

Technical Support	Telephone:	+1 613 • 652 • 4886
	After Hours Emergency:	+1 613 • 349 • 0006
	Email:	techsupport@rossvideo.com

General Information	Telephone:	+1 613 • 652 • 4886
	Fax:	+1 613 • 652 • 4425
	Email:	solutions@rossvideo.com
	Website:	http://www.rossvideo.com

Visit Us

Visit our website for:

- Company information and news
- Related products and full product lines
- Online catalog
- Testimonials

Video Production Technology